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A NEW SPECIES OF THE GENUS *MACRARGUS* (ARANEAE, LINYPHIIDAE, MICRONETINAE) FROM THE NORTH–EAST OF UKRAINE AND REDESCRIPTION OF TWO RELATED SPECIES

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A New Species of the Genus *Macrargus* (Araneae, Linyphiidae, Micronetinae) from the North-East of Ukraine and Redescription of Two Related Species. Gnelitsa V. A., Koponen S. — *Macrargus sumyensis* Gnelitsa et Koponen, sp. n. is described from the North-East of Ukraine. Two closely related species of the genus *Macrargus* Dahl, 1886, *Macrargus boreus* Holm, 1968 and *M. multesimus* (O.-P. Cambridge, 1875), are redescribed and illustrated in detail.

Key words: Araneae, Linyphiidae, Micronetinae, *Macrargus*, Ukraine.

Новый вид рода *Macrargus* (Araneae, Linyphiidae, Micronetinae) с северо-востока Украины и переописание двух близких видов. Гнелица В. А., Копонен С. — С северо-востока Украины описан *Macrargus sumyensis* Gnelitsa and Koponen, sp. n. Переописаны и детально проиллюстрированы два близких вида рода *Macrargus* Dahl, 1886: *M. boreus* Holm, 1968 и *M. multesimus* (O.-P. Cambridge, 1875).

Ключевые слова: Araneae, Linyphiidae, Micronetinae, *Macrargus*, Украина.

Introduction

According to the world spider catalogue (Platnick, 2010), the genus *Macrargus* Dahl, 1886 includes six species. One of them, *Macrargus multesimus* (O.-P. Cambridge, 1875), is distributed in the Holarctic; two other species, *M. rufus* (Wider, 1834) and *M. carpenteri* (O.-P. Cambridge, 1894) occur throughout the Palaearctic Region, whereas *M. boreus* Holm, 1968 and *M. excavatus* (O.-P. Cambridge, 1882) are known from Europe, and *M. alpinus* Li et Zhu, 1993 was described from China.

Two species, *M. rufus* and *M. carpenteri,* are confirmed from Ukraine with certainty. However, *Macrargus boreus* could be confirmed recorded in Ukraine with confidence only if males were collected. In the absence of males, females have been confused with *M. multesimus* (Esyunin, Golovatch, Penev, 1993; Esjunin, Penev, Golovatch, 1994; Penev, Esjunin, Golovatch, 1994). Females of these two species cannot be identified with certainty based on illustrations only (Palmgren, 1975; Hauge, 1969; Paquin et Dupérré, 2003; Tao et al., 1995; Wunderlich, 1995). Some variability of the lamella characteristica, the main distinctive feature, in *Macrargus boreus* has been shown by Huhta et Viramo (1979) in Finland. Palmgren (1975) suggested that *M. boreus* and *M. multesimus* possibly could be regarded as geographical races.

Our initial goal was to point out the diagnostic characters of *M. boreus* and *M. multesimus.* In the course of our study, it soon became clear that the spiders from Ukraine identified as "*M. boreus"* noticeably differed from *M. boreus* specimens as well as from *M. multesimus*. We found out that the Ukrainian *Macrargus* specimens represent an undescribed species, similar to both *M. boreus* and *M. multesimus.* This species is described below as *Macrargus sumyensis* sp. n., and comparative redescriptions and drawings of *Macrargus boreus* and *M. multesimus* are provided as well.

Material and methods

Specimens from Ukraine were collected using a hand-held suction sampler; drawings were made with a camera lucida. The holotype male is deposited in the collection of the Zoological Department of Sumy State

Teacher's Training University (SSTTU). All other specimens are deposited in the first author's private collection (VGC) and Zoological Museum of the University of Turku, Finland (ZMUT). Abbreviations of the names of palp and epigyne structures follow Saaristo, Tanasevitch (1996) and Merrett (1963): E — embolus; Ep — embolus proper; LC — lamella characteristica; LW — lateral wall of epigyne; M — median membrane; Pc — paracymbium; Ph — pit hook; Ps — proscapus; R — radix; SA — suprategular apophysis; St — subtegulum; T — tegulum; TA — terminal apophysis. All measurements are in millimeters.

Results and discussion

Macrargus multesimus (O.-P. Cambridge, 1875)
(fig. 1, *a*, *b*; 2, *a*, *b*; 3, *a*, *b*; 4, a-c)

Erigone multesima O.-P. Cambridge, 1875: 402, pl. 46, fig. 9.
Linyphia mordax Koch, 1879: 13, pl. 1, fig. 3.
Erigone granulosa Koch, 1879: 43, pl. 2, fig. 1.
Microneta discolor Emerton, 1882: 75, pl. 24, fig. 1.
Tmeticus granulosus Simon, 1884: 420; Grese, 1909: 327, pl. 7, fig. 5.
Centromerus granulosus Reimoser, 1919: 80.
Microneta multesima Crosby, Bishop, 1928: 1049.
M. multesimus (O.-P. Cambridge, 1875): Holm, 1945: 44.

Material. 4 ♂, 3 ♀, Finland, Utsjoki, Kevo, mountain birch forest, 05.06–05.09.1973 (Koponen) (ZMUT).

Distribution. **Europe**. Belarus; Finland; Norway (mainland); Russia (Central, East, North, Northwest); Sweden (Helsdingen, 2009); **Asia:** Northern Asia (Russia); Mongolia; NE China; **North America:** Canada; USA (Alaska; Atlantic coast) (Eskov, 1994).

Data on *M. multesimus* in Ukraine are questionable and need to be corroborated (Esyunin, Golovatch, Penev, 1993; Esjunin, Penev, Golovatch, 1994; Penev, Esjunin, Golovatch, 1994).

Description. Male. Total length 3.08. Carapace 1.40 long, 1.02 wide, orange. Sternum 0.73 long, 0.76 wide, gray-orange some darker at the margin. Posterior median eyes separated by their diameter. Promargins of chelicerae with 4 teeth, retromargins with 5 teeth, frontal surface with strong tooth bearing a spine on its tip (fig. 1, *b*). Legs: tibia spination 2 : 2 : 2 : 2; position of metatarsal trichobothrium: I — 0.49; II — 0.53; III — 0.48; IV — 0.50.

Length of leg segments:

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.13	0.36	1.09	1.00	0.69
II	1.09	0.35	0.97	0.90	0.60
III	0.92	0.32	0.77	0.76	0.50
IV	1.26	0.34	1.15	1.08	0.64

Abdomen uniformly dark grey.

Palp as in figures 1, *a*; 2, *a*, *b*; 3, *a*.

Female. Total length 3.18. Carapace 1.27 long, 0.86 wide, orange. Sternum 0.7 long, 0.66 wide, gray-orange, somewhat darker at the margin. Posterior median eyes are approximately one eye diameter apart. Promargins of chelicerae with 4–5 teeth, retromargins with 5–6 teeth. Legs: tibia spination as in male. Position of metatarsal trichobothrium: I — 0.55; II — 0.50; III — 0.45; IV — 0.50.

Length of leg segments:

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.09	0.36	1.05	0.95	0.63
II	1.06	0.35	0.91	0.85	0.57
III	0.91	0.32	0.72	0.76	0.49
IV	1.25	0.34	1.13	1.08	0.60

Abdomen uniformly dark grey.

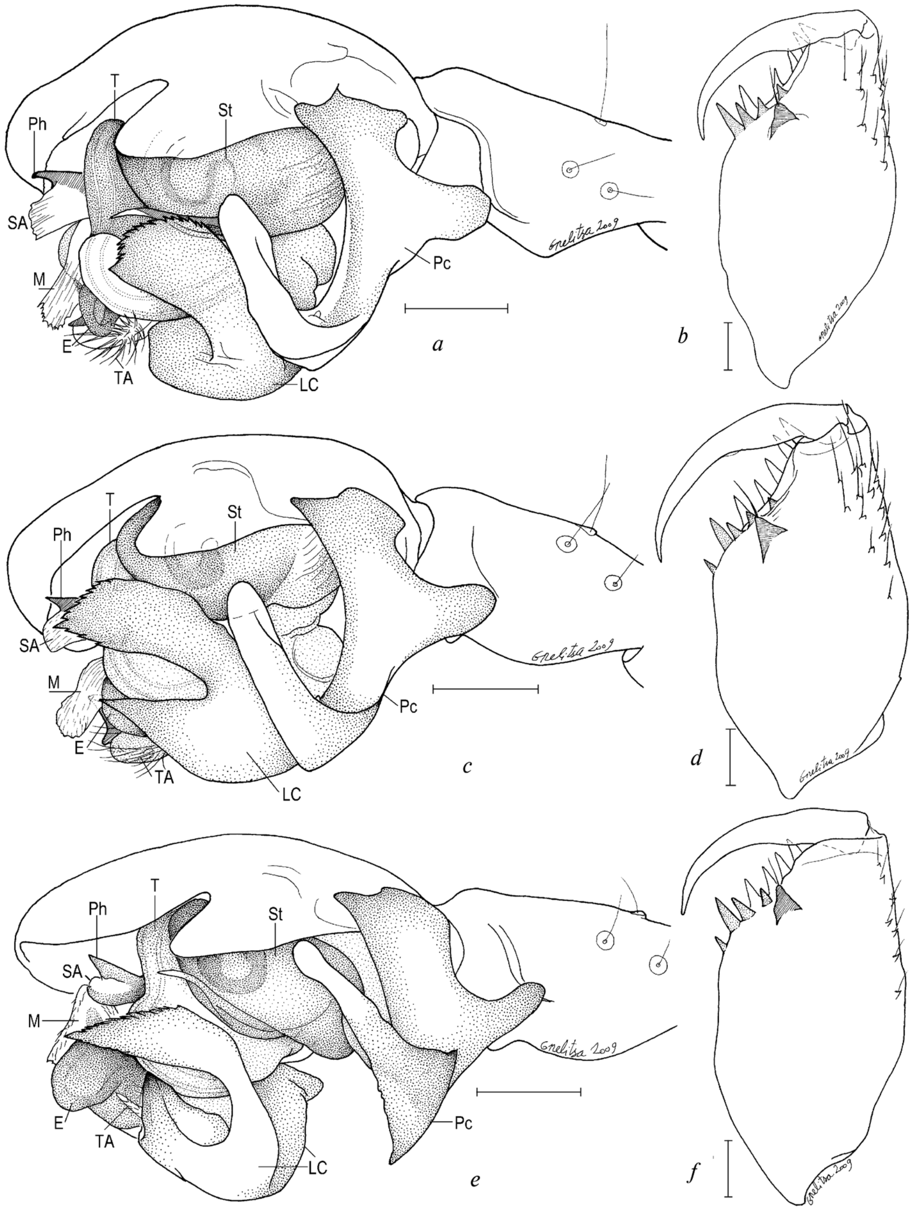


Fig. 1. Male palp laterally and chelicera frontally: *a*, *b* — *Macrargus multesimus*; *c*, *d* — *M. sumyensis* sp. n.; *e*, *f* — *M. boreus*. Scale bars 0.1 mm.

Рис. 1. Пальпа самца сбоку и хелицера спереди: *a*, *b* — *Macrargus multesimus*; *c*, *d* — *M. sumyensis* sp. n.; *e*, *f* — *M. boreus*. Масштабные линейки 0,1 мм.

Epigyne and vulva as in figures 3, *b*; 4, *a-c*.

Discussion. Male can be easily recognized by the configuration of the lamella characteristica, the lower branch of which is shaped as a rounded trapezoid from the lateral view (fig. 1, *a*). One can see from below (fig. 2, *a*) that lower branch is pointed and directed beneath the proximal widened part of the lamella characteristica. The distal piece of the upper branch has a straight lower edge and the rounded upper edge. The pit hook (Ph) and the pointed trapezoid-shaped lamella of the suprategular apophysis (SA) are separated by a rounded indentation (fig. 2, *b*).

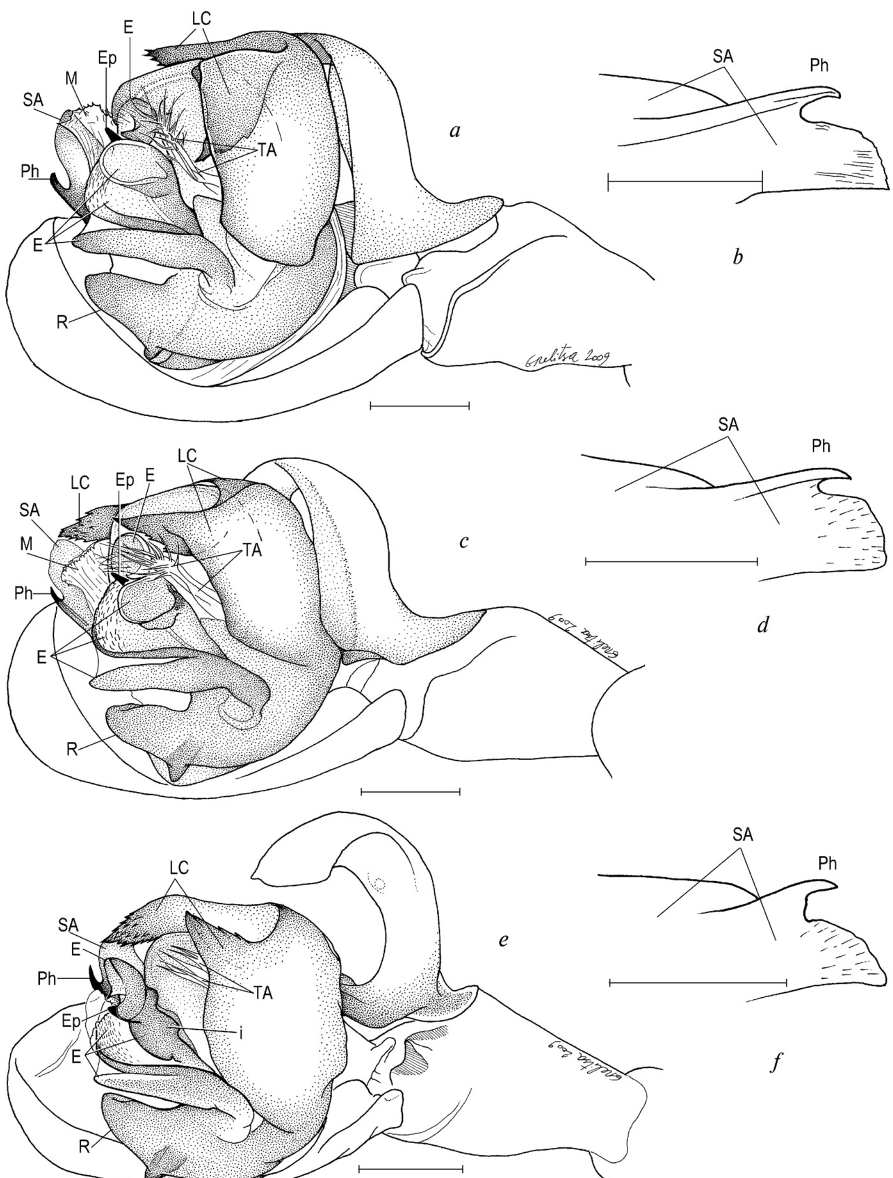


Fig. 2. Male palp ventrally and suprategular apophysis: *a*, *b* — *Macrargus multesimus*; *c*, *d* — *M. sumyensis* sp. n.; *e*, *f* — *M. boreus*. Scale bars 0.1 mm.

Рис. 2. Пальпа самца снизу и супратегулярная апофиза: *a*, *b* — *Macrargus multesimus*; *c*, *d* — *M. sumyensis* sp. n.; *e*, *f* — *M. boreus*. Масштабные линейки 0,1 мм.

Female differs by a relatively large epigyne (fig. 3, *b*), the ratio of the proscapus length/width in the narrowest place is 1.88.

Macrargus sumyensis Gnelitsa et Koponen, **sp. n.**
(fig. 1, *c*, *d*; 2, *c*, *d*; 3, *c*, *d*; 4, *d*-*f*)

M a t e r i a l. Holotype ♂, Ukraine, Sumy Region, Lebedin, *Pinus* forest, with *Quercus*, *Populus*, *Betula* and *Caragana*, 29.08.2000 (Gnelitsa) (SSTTU).

Paratypes: 3 ♂ 4 ♀ the same locality and data (Gnelitsa) (VGC).

Additional material. Ukraine, Sumy Region: Konotop District, Zheldaki vil., 17 ♀, 22.05.2003; Krolevets District, Gruzskoye vil.: ♀, 17.09.1989; ♀, ♂, 10.09.1989; 2 ♂, ♀, 21.09.1989; 4 ♂, ♀, 10.09.1989; 2 ♀,

07.09.1989; 3 ♂, 2 ♀, 16.09.1989; ♂, 4 ♀, 06.09.1989; ♂, 5 ♀, 02.09.1989; 5 ♂, 6 ♀, 20.09.1989; Lebedin District, Lebedin: ♂ 17.09.1992; ♀, 16.10.1991; ♀, 19.06.1992; ♀, 08.07.1999; ♀, 21.04.2000; 2 ♂, 3 ♀, 10.10.1998; 4 ♀, 23.10.1992; 3 ♂, 5 ♀, 14.09.2000; Putivl District, Kardashi vil., 4 ♀, 06.10.2000; Seredinobuda District, Staraya Guta vil.: ♂, 19.09.2000; ♀, 08.05.1990; ♀, 16.09.2000; ♀, 19.09.2000; ♀, 13.05.2001; ♀, 16.05.2001; ♀, 17.05.2001; ♂, ♀, 16.09.2000; 2 ♀, 13.05.2001; 2 ♀, 15.05.2001; 2 ♂, 5 ♀, 19.09.2000; Shostka District, Shostka, ♀, 12.06.1997; Gamaleyevka vil.: ♂, 18.09.1998; ♂, ♀, 17.09.1998; Yampol District, Prudishche vil.: ♂, 05.05.2000; ♀, 08.06.1997; ♀, 18.07.1999; ♀, 20.07.1999; ♀, 03.05.2000; ♀, 06.05.2000; 6 ♂, 3 ♀, 14.09.1999; ♂, 4 ♀, 16.09.1999; 5 ♀, 05.05.2000, (Gnelitsa), (VGC).

Macrargus multesimus from Belarus: Gomel Region, Struki, 12 km NE from Buda-Koshelevo, 7–9.09.1989, interfluve *Querceto-Carpinetum nudum*; from Russia: Bryansk Region, Khinel, 25 km SW from Sevsk, 18–19.09.1990, *Quercetum caricoso-aegopodiosum* on fluvial terrace; Belgorod Region, Les-na-Vorskle Reserve, 24–26.09.1990, upland *Quercetum aegopodioso-caricosum pilosae*; and from Ukraine: Sumy Region, Trostyanets, 21–23.09.1990, interfluve *Quercetum aegopodiosum* (Esyunin, Golovatch, Penev, 1993; Esjunin, Penev, Golovatch, 1994; Penev, Esjunin, Golovatch, 1994) appeared to be *M. sumyensis* sp. n.

Diagnosis. The male of this species can be well distinguished by the lamella characteristica (LC). The upper branch of LC is elongated and its initially parallel edges are going to the point along the distant quarter of the branch. The pointed lower branch is directed nearly parallel to the upper one (fig. 1, *c*). The pit hook (Ph) and the rounded-trapezoid lamella of the suprategular apophysis (SA) are separated by a rounded indentation (fig. 2, *d*). Chelicerae with noticeably long fangs (fig. 1, *d*), bear the numerous tiny tubercles with spines on its lateral side.

The epigyne resembles those of *M. multesimus* though it is smaller and the ratio of the proscapus length/width in its narrowest place is 2. The other distinctive features are the configuration of the dorsal part of the epigyne (fig. 4, *e*) and some small details of vulva (fig. 4, *f*).

Description. Male. Total length 2.8. Carapace 1.16 long, 0.87 wide, orange. Sternum 0.57 long, 0.64 wide, light-brown some darker at the margin. Posterior median eyes separated by 3/5 their diameter. Promargins of chelicerae with 5 teeth, retromargins with 5 teeth, frontal surface with strong tooth bearing the spine on its tip (fig. 1, *d*). Legs: tibia spination 2 : 2 : 2 : 2; position of metatarsal trichobothrium: I — 0.48; II — 0.49; III — 0.48; IV — 0.52.

Length of leg segments:

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.06	0.31	1.02	0.94	0.66
II	0.99	0.31	0.91	0.83	0.57
III	0.87	0.28	0.69	0.74	0.46
IV	1.15	0.29	1.06	0.99	0.57

Abdomen uniformly dark grey.

Palp as in figures 1, *c*; 2, *c*, *d*; 3, *c*.

Female. Total length 2.8. Carapace 1.33 long, 0.97 wide, yellow-orange. Sternum 0.67 long, 0.71 wide, gray-orange. Posterior median eyes are a diameter of one apart. Promargins of chelicerae with 5 teeth, retromargins with 5 teeth. Legs: tibia spination as in male. Position of metatarsal trichobothrium: I — 0.55; II — 0.51; III — 0.52; IV — 0.52.

Length of leg segments:

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.19	0.35	1.04	0.97	0.63
II	1.09	0.35	0.94	0.87	0.55
III	0.97	0.32	0.77	0.77	0.48
IV	1.32	0.34	1.16	1.08	0.59

Abdomen uniformly dark grey.

Epigyne and vulva as in figures 3, *d*; 4, *d-f*.

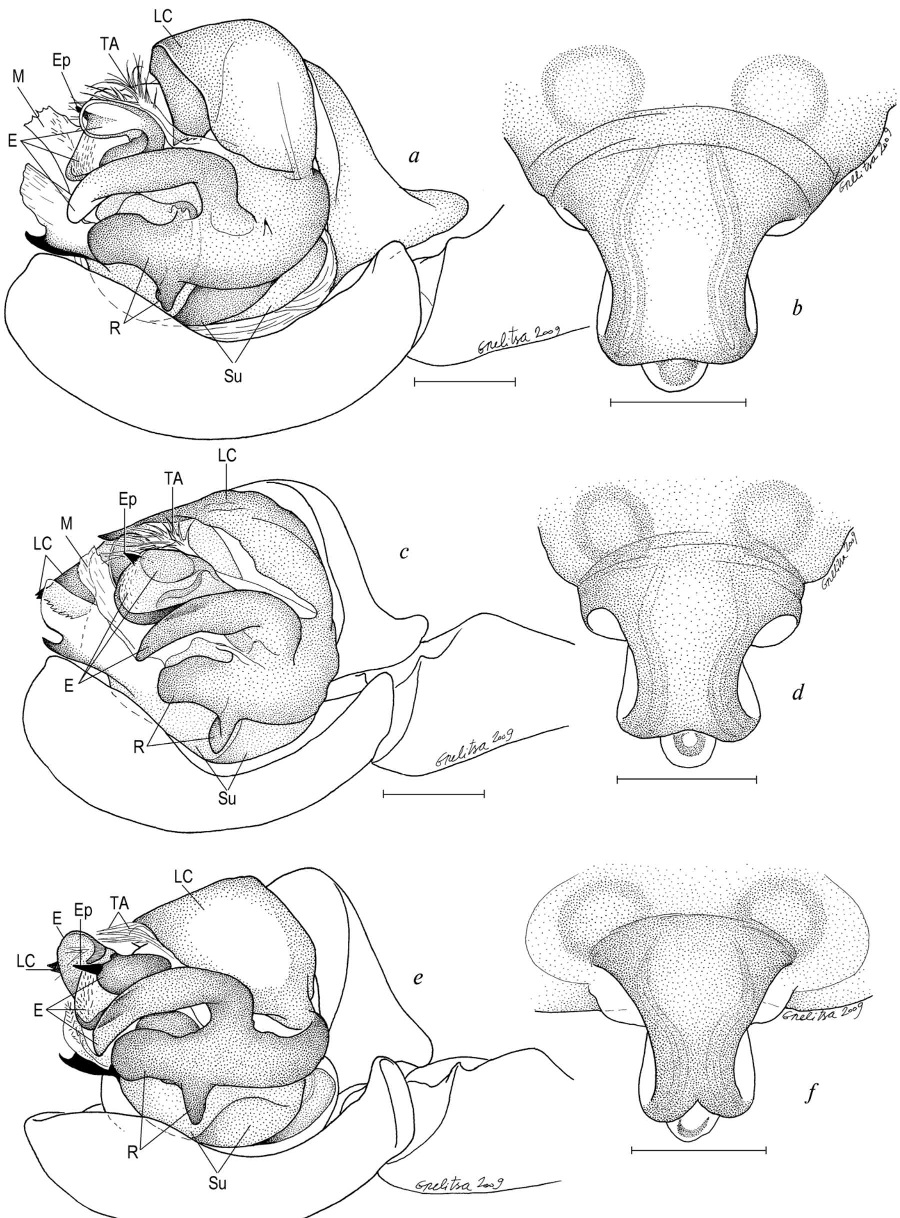


Fig. 3. Male palp mesially and epigyne ventrally: *a*, *b* — *Macrargus multesimus*; *c*, *d* — *M. sumyensis* sp. n.; *e*, *f* — *M. boreus*. Scale bars 0.1 mm.

Рис. 3. Пальпа самца от средины и эпигина снизу: *a*, *b* — *Macrargus multesimus*; *c*, *d* — *M. sumyensis* sp. n.; *e*, *f* — *M. boreus*. Масштабные линейки 0,1 мм.

Biology. The spiders inhabit the litter mostly in mixed forests: *Pinus*, *Betula* with *Quercus*, *Sorbus*, rare *Acer*, *Corylus*, *Frangula*, *Vaccinium*. Adult spiders occur from April to July and in September — October with distinct peaks of quantity in May and in September.

Macrargus boreus Holm, 1968 (fig. 1, e, f; 2, *e*, *f*; 3, *e*, *f*; 4, *g*-*i*)

M. boreus Holm, 1968: Huhta, Viramo, 1979: 175, fig. 2; Palmgren, 1975: 19, fig 4 (5, 6).

Material. 3 ♂ 3 ♀, Finland, Naantali, Luonnonmaa, Tamminiemi, grove, 02.12.1972–24.03.1973 (R. Mannila) (ZMUT).

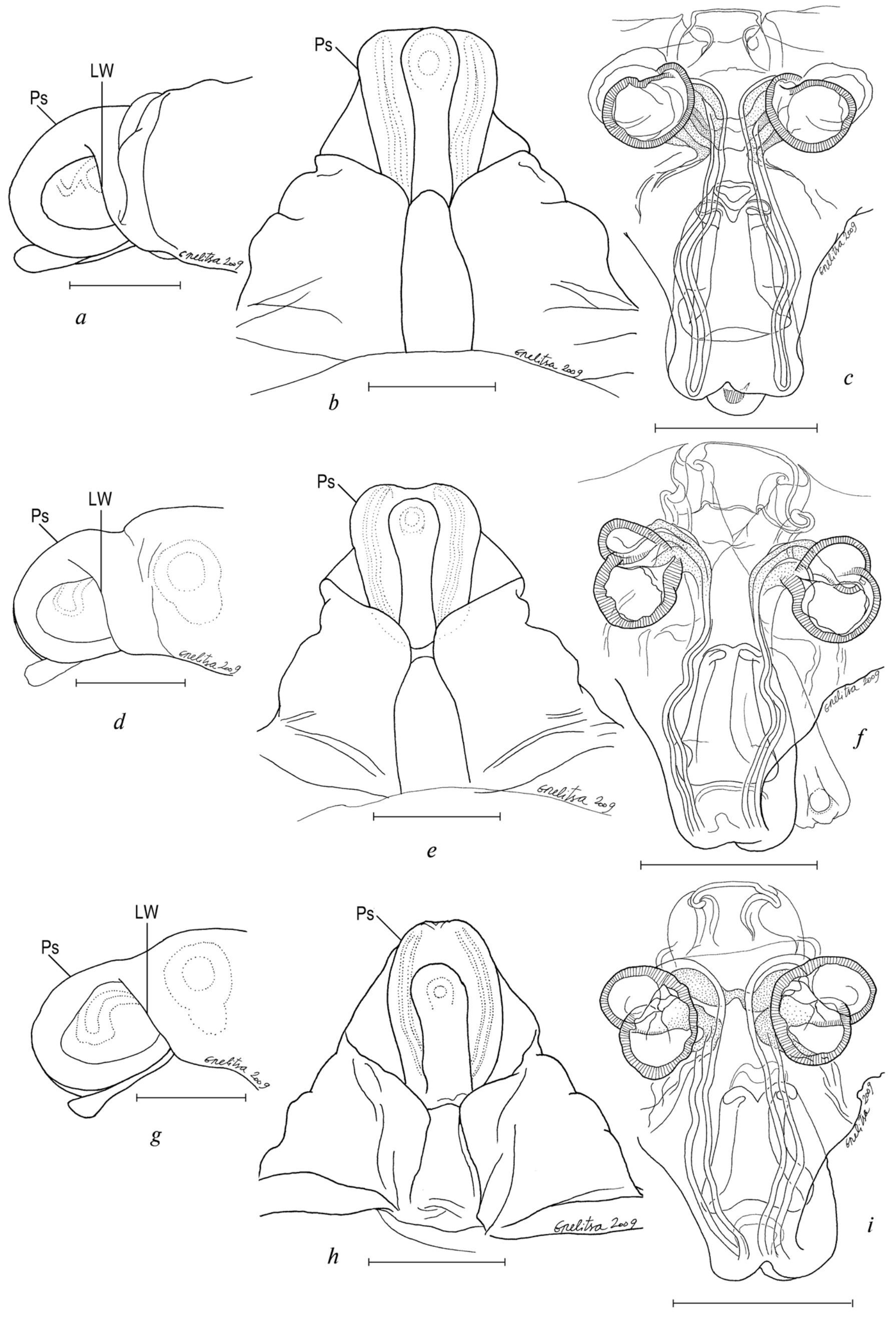


Fig. 4. Epigyne laterally, dorsally and vulva: *a*, *b*, *c* — *Macrargus multesimus*; *d*, *e*, *f* — *M. sumyensis* sp. n.; *g*, *h*, *i* — *M. boreus*. Scale bars 0.1 mm.

Рис. 4. Эпигина сбоку, сверху и вульва: *a*, *b*, *c* — *Macrargus multesimus*; *d*, *e*, *f* — *M. sumyensis* sp. n.; *g*, *h*, *i* — *M. boreus*. Масштабные линейки 0,1 мм

Distribution. **Europe**: Estonia; Finland; Norway (mainland); Sweden (Helsdingen, 2009); the data from the Central Russia, Moscow Region (Michailov, 1983, 1997) need to be corroborated.

Misidentifications. *Macrargus boreus* Holm, 1968 (Gnelitsa, 1997; 2000 a; b; c) = *Macrargus sumyensis* sp. n.

Description. Male. Total length 2.8. Carapace 1.22 long, 0.91 wide, brown-orange. Sternum 0.64 long, 0.62 wide, orange. Posterior median eyes separated by approximate-

ly of eye diameter. Promargins of chelicerae with 4 teeth, retromargins with 4 teeth, frontal surface with strong tooth bearing the spine on its tip (fig. 1, *f*). Legs: tibia spination 2 : 2 : 2 : 2; position of metatarsal trichobothrium: I — 0.51; II — 0.55; III — 0.49; IV — 0.54.

Length of leg segments:

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.06	0.31	1.06	0.95	0.69
II	0.99	0.31	0.90	0.85	0.60
III	0.84	0.29	0.69	0.73	0.48
IV	1.13	0.29	1.06	1.02	0.63

Abdomen uniformly dark grey.

Palp as in figures 1, *e*; 2, *e*; *f*; 3, *e*.

Female. Total length 2.59. Carapace 1.30 long, 0.98 wide, orange. Sternum 0.71 long, 0.63 wide, orange, some darker at the margin. Posterior median eyes are a diameter of one apart. Promargins of chelicerae with 5 teeth, retromargins with 4 teeth. Legs: tibia spination as in male. Position of metatarsal trichobothrium: I — 0.60, II — 0.59, III — 0.54, IV — 0.60.

Length of leg segments:

Leg	Femur	Patella	Tibia	Metatarsus	Tarsus
I	1.12	0.35	1.04	0.92	0.64
II	1.06	0.35	0.94	0.84	0.56
III	0.94	0.32	0.77	0.74	0.46
IV	1.26	0.34	1.15	1.06	0.58

Abdomen uniformly dark grey.

Epigyne and vulva as in figures 3, *f*; 4, *g-i*.

Discussion. Males of *M. boreus* are easy to recognize by the lamella characteristi-ca (LC) with lower branch directed towards the upper branch of LC. The straight edges of the upper branch of LC form an acute angle (fig. 1, *c*). The wide proximal part of LC covers almost whole terminal apophysis except its short distal piece (fig. 2, *e*). One can see the differences in embolus details (i) as well (fig. 2, *e*).

The pit hook (Ph) and the triangular lamella of the suprategular apophysis (SA) are separated by the square — indentation (fig. 2, *f*).

The female is recognizable by a relatively narrow epigyne, the ratio of the proscapus length/width in the narrowest place is 2.66. Contrary to both *M. multesimus* and *M. sumyensis* sp. n. proscapus (Ps) is oval (fig. 4, *h*) and the line of the lateral wall of the epigyne (LW) is straight, not curved (fig. 4, *g*). The general appearance of the epigyne dorsal view (fig. 4, *h*) and some details of vulva (fig. 4, *i*) are different as well.

Some of the palp and epigyne features (embolus configuration; open position of terminal apophysis; distal part of the suprategular apophysis; ventral, dorsal and lateral appearance of epigyne) indicate that *Macrargus multesimus* and *M. sumyensis* sp. n. are more close together than *M. multesimus* with *M. boreus*.

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Cambridge O.-P. On some new species of Erigone from North America // Proc. Zool. Soc. Lond. — 1875. — P. 393–405.

Crosby C. R., Bishop S. C. Araneae. In A list of the insects of New York // Mem. Cornell Univ. Agr. Exp. Sta. — 1928. — **101**. — P. 1034–1074.

Emerton J. H. New England spiders of the family Theridiidae // Trans. Conn. Acad. Arts Sci. — 1882. — **6**. — P. 1–86.

Esyunin S. L., Golovatch S. I., Penev L. D. The fauna and zoogeography of spiders inhabiting oak forests of the East European Plain (Arachnida: Araneae) // Ber. nat.-med. Verein Innsbruck. — 1993. — **80**. — S. 175–249.

Esjunin S. L., Penev L. D., Golovatch S. I. Distribution and assemblage classification of spiders of the East European oak forests (Arachnida, Aranei) // Arthropoda Selecta. — 1994. — **3** (3–4). — P. 67–98.

Gnelitsa V. A. Habitat distribution of spiders from the family Linyphiidae in the conditions of Ukrainian forest-steppe // Byulleten' Moskovskogo obshchestva Ispytateley Prirody. Otdel Biologia. — 1997. — **102**, N 2. — P. 34—38. — Russian : *Гнелица В. А.* Биотопическая приуроченность пауков семейства Linyphiidae в условиях Лесостепи Украины // Бюлл. Моск. об-ва испытат. природы. Отд. Биол.

Gnelitsa V. A. Preliminary data on the spiders of the Desnansko—Starogutskiy Nature park // Zapovidna Sprava v Ukraini. — 2000 a. — **6**, N 1—2. — P. 76—77. — Russian : *Гнелица В. А.* Предварительные данные о пауках Деснянско-Старогутского национального парка // Заповідна справа в Україні.

Gnelitsa V. A. The Linyphiid spiders of the Ivot river bottom land (the Sumy Area) // Zapovidna Sprava v Ukraini. — 2000 b. — **6**, N 1—2. — P. 77—80. — Russian : *Гнелица В. А.* Пауки сем. Linyphiidae поймы р. Ивот (Сумская область) // Заповідна справа в Україні.

Gnelitsa V. A. The spider fauna of the family Linyphiidae of the Forest—Steppe zone of Ukraine: 1. Subfamily Linyphiidae // Izvestiya Kharkovskogo Entomologicheskogo Obshchestva. — 2000 c. — **8**, N 1. — P. 132—139. — Russian : *Гнелица В. А.* Фауна пауков семейства Linyphiidae лесостепной зоны Украины. 1. Подсемейство Linyphiinae // Известия Харьковского энтомологического общества.

Grese N. S. Die Spinnen der Halbinsel Jamal // Iejegod. Zool. Mouz. Akad. Naouk SSSR. St. Petersb. — 1909. — **14**. — P. 325—331.

Hauge E. Six species of spiders (Araneae) new to Norway // Norsk. ent. Tidsskr. — 1969. — **16**. — P. 1—8.

Helsdingen P. J. van. Araneae // Fauna Europaea Database — 2009. — http:// www.european-arachnology.org

Holm E. Zur Kenntnis der Spinnenfauna des Torneträskgebietes // Ark. Zool. — 1945. — **36** (A 15). — P. 1—80.

Huhta V., Viramo J. Spiders active on snow in Northern Finland // Ann. Zool. Fennici. — 1979. — **16**. — P. 169—176.

Koch L. Arachniden aus Sibirien und Novaja Semlja, eingesammelt von der schwedischen Expedition im Jahre 1875 // Kongl. Svenska. Vet.-Acad. Handl. — 1879. — **16** (5). — P. 1—136.

Merrett P. The palpus of male spiders of the family Linyphiidae // Proc. Zool. Soc. Lond. — 1963. — **140**. — P. 347—467.

Mikhaylov K. G. Catalogue of spiders (Arachnida, Aranei) of the Moscow Area: Fauna i Ekologiya Pochvennykh Bespozvonochnykh Moskovskoy Oblasty. — Moskow : Nauka, 1983. — P. 67—85. — Russian : *Михайлов К. Г.* Каталог пауков (Arachnida, Aranei) Московской области: Фауна и экология почвенных беспозвоночных Московской области.

Mikhailov K. G. Catalogue of the spiders (Arachnida, Aranei) of the territories of the former Soviet Union. Addendum 1. — Moskow : KMK Scientific Press, 1997. — 48 p.

Palmgren P. Die Spinnenfauna Finnlands und Ostfennoskandiens VI: Linyphiidae 1 // Fauna fenn. — 1975. — **28**. — P. 1—102.

Paquin, P., Dupérré N. Guide d'identification des araignées de Québec // Fabreries, Suppl. — 2003. — **11**. — P. 1—251.

Penev L. D., Esjunin S. L., Golovatch S. I. Species diversity versus species composition in relation to climate and habitat variation: a case study on spider assemblages (Aranei) of the East European oak forests // Arthropoda Selecta. — 1994. — **3** (1—2). — P. 65—99.

Platnick N. I. The world spider catalog, version 11.0. American Museum of Natural History. — 2010. — http://research.amnh.org/entomology/spiders/catalog/index.html.

Reimoser E. Katalog der echten Spinnen (Araneae) des Paläarktischen Gebietes // Abh. zool. bot. Ges. Wien. — 1919. — **10** (2). — P. 1—280.

Saaristo M. I., *Tanasevitch A. V.* Redelimitation of the subfamily Micronetinae Hull, 1920 and the genus Lepthyphantes Menge, 1866 with descriptions of some new genera (Aranei, Linyphiidae) // Ber. Nat.-Med. Verein Innsbruck. — 1996. — **83**. — P. 163—186.

Simon E. Les arachnides de France. — Paris, 1884. — **5**. — P. 180—885.

Tao Y., Li S. Q., Zhu C. D. Linyphiid spiders of Changbai Mountains, China (Araneae: Linyphiidae: Linyphiinae) // Beitr. Araneol. — 1995. — **4**. — P. 241—288.

Wunderlich J. Linyphiidae aus der Mongolei (Arachnida: Araneae) // Beitr. Araneol. — 1995. — **4**. — P. 479—529.